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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/541,745

07/08/2005

Hiroshi Yamamoto

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EXAMINER

NELSON, MICHAEL E

ART UNIT

PAPER NUMBER

4174

MAIL DATE

DELIVERY MODE

01/17/2008

PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

<b>Office Action Summary</b>	<b>Application No.</b> 10/541,745	<b>Applicant(s)</b> YAMAMOTO ET AL.	
	<b>Examiner</b> MICHAEL E. NELSON	<b>Art Unit</b> 4174	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☐ Responsive to communication(s) filed on \_\_\_\_.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_.
  3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)            | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | Paper No(s)/Mail Date. ____.                                      |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date <u>07/08/2005</u> .  | 6) <input type="checkbox"/> Other: ____.                          |

## **DETAILED ACTION**

### ***Claim Objections***

1. Claims 12, 15-20 are objected to because of the following informalities:
2. Claim 12 claims the derivative according to claim 9, where at least one of L<sup>1</sup> and L<sup>2</sup> is one of the groups shown. However, L<sup>1</sup> and L<sup>2</sup> are divalent groups, while the structures show only monovalent substituents.
3. For the purpose of examination, the claim will be interpreted where the second bond in the divalent linking group is at any other position than the first bond indicated in the claim.
4. Claim 15 states, "An comprising at least one organic compound layer...." It is apparent that Applicant intends "An organic electroluminescent device comprising at least one organic compound layer...."
5. Claims 16-20 are objected to because they depend from claim 15.
6. Appropriate correction is required.

### ***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

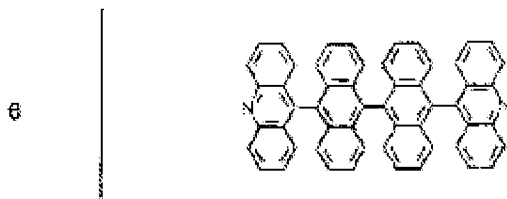
(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States

Art Unit: 4174

only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-5, 8, 14-17 are rejected under 35 U.S.C. 102(b) as being anticipated by Tamano et al. JP 11-111458.

9. Concerning claims 1-5 and 8 Tamano et al. describe material for an organic electroluminescent device with the structure shown below (compound 6, page 10). This compound meets the limitation of claim 1 where HAr is acridinyl (per claims 4 and 5), as shown below, L is anthracene (14 carbons, per claim 2) or a single bond (per claim 3); Ar<sup>1</sup> is anthracene (when L is a single bond, 14 carbons, per claim 3), (or di-anthracene where L' is a single bond, per claim 8); and Ar<sub>2</sub> is either acridinyl-anthracene (27 carbons, when L is a single bond, and Ar<sup>1</sup> is anthracene, per claim 3) or acridine, (13 carbon heterocycle, (when L is single bond and Ar<sup>1</sup> is dianthracene, per claim 8, or when L is anthracene, and Ar<sup>1</sup> is anthracene, per claim 2).



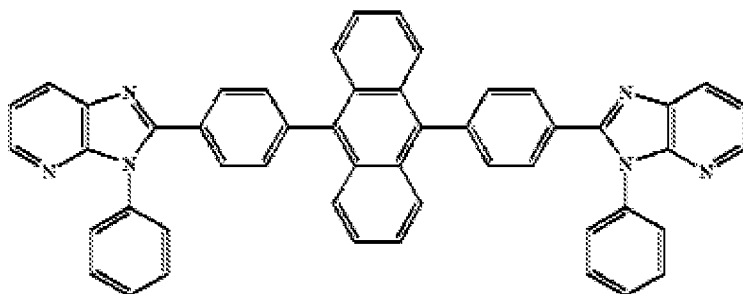
10. Concerning claims 14-17, Tamano et al. describe an electroluminescent device where the above compound is contained in the light emitting layer. (Example 10, Table 2, [0075]-[0077])

11. Claims 1-4, 6-8, and 14-18 are rejected under 35 U.S.C. 102(b) as being anticipated by Okada et al. (JP 2001-335776) based on English Language Equivalent, US 6,461,747.

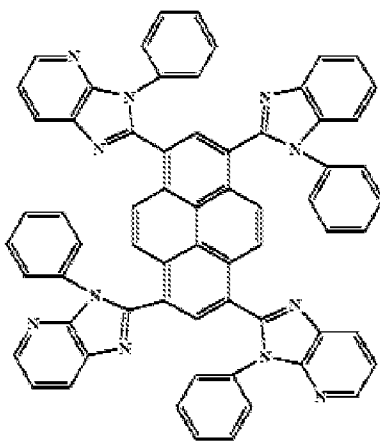
Art Unit: 4174

12. Concerning claim 1-2, 6 and 8, Okada et al. describe organic electroluminescent devices and heterocyclic compounds for use in organic electroluminescent devices.

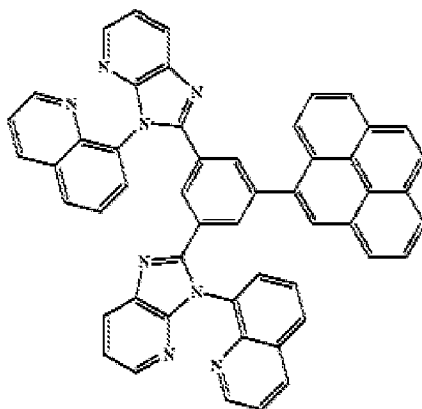
Among the compounds described is the compound shown below (compound 5, column 21-22), which meets the limitations of claims 1, 2, 6 and 8, where HAr is imidazopyridine (6 carbons with a phenyl substituent, per claim 1), L is a phenylene group (6 carbons, per claims 2 and 6), Ar<sup>1</sup> is anthracenyl (14 carbons, per claims 2 and 8), and Ar<sub>2</sub> is phenyl (6 carbons, with a imidazopyridine substituent).



13. Concerning claims 1 and 3, Okada et al. disclose the compound having the structure shown below (compound 48, column 35), which meets the limitations of claims 1 and 3 where HAr is imidazopyridine (6 carbons with a phenyl substituent, per claim 1), L is a single bond (per claim 3), Ar<sup>1</sup> is a pyrene (divalent condensed aromatic hydrocarbon with 16 carbons, with two imidazopyrimidine substituents, and Ar<sup>2</sup> is another imidazopyrimidine with a phenyl substituent (6 carbons, per claim 1)



14. Concerning claims 1-2, 4 and 7, Okada et al. disclose the compound shown below (compound 97, column 52), which meets the limitations of claims 1-2, 4 and 7 where HAr is quinolinyl (9 carbons, per claims 1 and 4 (formula (8))), L is imidazopyridine (6 carbon heteroaryl group, per claim 1 and 2), Ar<sup>1</sup> is phenylene with a heteroaromatic substituent (quinolinyl imidazopyridine), and Ar<sub>2</sub> is pyrene (aryl group having 16 carbons, per claims 1 and 7).



15. Concerning claims 14-18, Okada et al. describe the use of the compounds in an electroluminescent device, particularly in the light emitting layer (example 1, column 71,

line 52-Column 72, line 14, and Table 1), or in the electron transport layer. (example 2, column 73, lines 18-47, and Table 2)

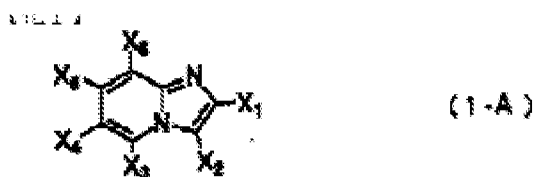
***Claim Rejections - 35 USC § 103***

16. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

17. Claims 9-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Nakatsuka et al. (JP 2001-035664).

18. Concerning claims 9-13, Nakatsuka et al. describe compounds containing the imidazopyridine structure shown below. [0007] Nakatsuka et al. use the compounds in an organic electroluminescent device. Nakatsuka et al. define the substituents on the molecule where X<sub>4</sub> includes substituted or unsubstituted aryl substituents (claim 7, [0007]). Nakatsuka et al. explicitly mention 1- and 2-naphthyl substituents [0014], and aryl substituents of 6-10 carbons are preferred, but are not limited [0020].

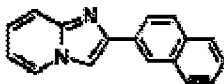


Nakatsuka et al. give several examples, including naphthyl substituents (shown below, compound A-50, page 13), though they do not illustrate specifically a naphthyl

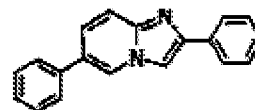
Art Unit: 4174

substituent at X<sub>4</sub>, but do give examples of aryl substitution at position X<sub>4</sub>, as shown below (compound A-71, page 17, column 31).

A-50

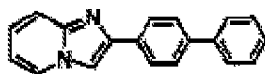


A-71



Nakatsuka et al. give further examples of compounds with more than one aryl ring, such as the compounds shown below. (Compound A-32, column 21)

A-32



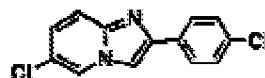
Nakatsuka et al. describe compounds which could easily be functionalized with other substituents by simply Suzuki type coupling reactions, such as the compounds shown below (A-19, page 9, A-26 and A-27, page 11; A-14, page 13; and A-72, page 17).

These compounds can easily be further functionalized at either end of the molecule.

A-19



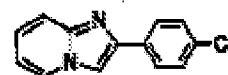
A-26



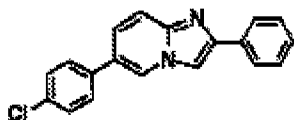
A-27



A-43



A-72

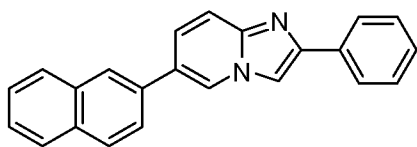


Given the level of detail in the disclosure, it would have been obvious to one of ordinary skill in the art to make imidazopyrimidine compounds such as the ones shown below (among others), since they would be predicted to function in the same manner. The

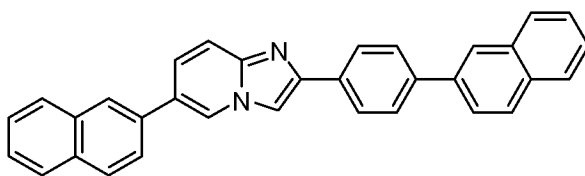


Art Unit: 4174

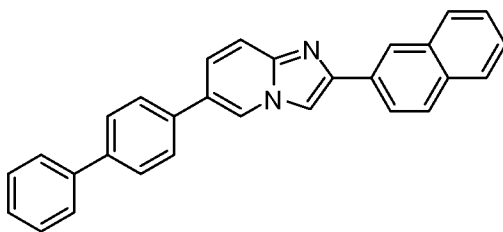
compounds shown below could be easily prepared from compounds A-19, A-25, or A-27 shown above by a single reaction.



This compound meets the limitations of claims 9-11, where Ar<sup>1</sup> is naphthyl (10 carbons), and Ar<sup>2</sup> is phenyl (6 carbon aromatic), and L<sup>1</sup> and L<sup>2</sup> are both single bonds.



This compound meets the limitations of claims 9-12 where Ar<sup>1</sup> is naphthyl (10 carbons), and Ar<sup>2</sup> is phenyl (6 carbon aromatic), and L<sup>1</sup> is a single bond, and L<sup>2</sup> is phenylene, per claim 12



This compound meets the limitations of claims 9-13 where Ar<sup>1</sup> is phenyl (6 carbon aromatic, per claims 9-11 and 13), Ar<sup>2</sup> is naphthyl (10 carbon aromatic), L<sup>1</sup> is phenylene (per claim 12), while L<sup>2</sup> is a single bond.

Art Unit: 4174

19. Claims 19-20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Okada et al. (JP 2001-335776) as applied to claim 18 above, and further in view of Kido et al. 6,013,384.

20. Concerning claims 19-20, Okada et al. describe the electroluminescent device discussed above, where the heterocyclic compounds were used in the electron transport layer. Okada et al. are silent on the use of a reductive dopant in the electron transport layer.

21. Kido et al. describe Organic Electroluminescent devices where the electron transport layer adjacent to the cathode is doped with a metal capable of acting as an electron donor (reductive dopant). Kido et al. disclose that doping the layer results in a lowered driving voltage, regardless of the work function of the cathode material. (abstract). Kido et al. disclose that the dopant includes alkali metals, and alkali earth metals. (column 4, lines 8-11)

22. Given the teaching of the benefit of doping the electron transport layer with a reductive dopant, as described by Kido et al. it would have been obvious to one of ordinary skill in the art to dope the electron transport layer (comprising the heterocyclic compound) adjacent to the cathode with a reductive dopant to decrease the driving voltage.

### ***Double Patenting***

23. The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the “right to exclude” granted by a patent and to prevent possible harassment by multiple assignees. A nonstatutory

Art Unit: 4174

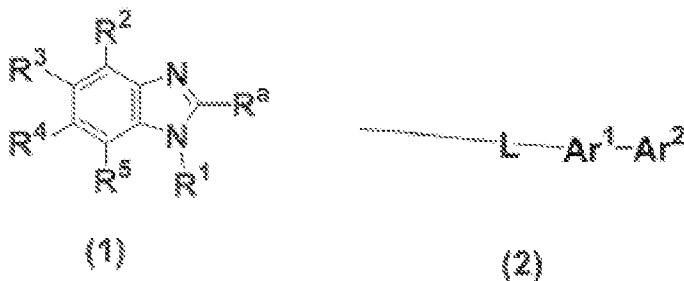
obviousness-type double patenting rejection is appropriate where the conflicting claims are not identical, but at least one examined application claim is not patentably distinct from the reference claim(s) because the examined application claim is either anticipated by, or would have been obvious over, the reference claim(s). See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) or 1.321(d) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent either is shown to be commonly owned with this application, or claims an invention made as a result of activities undertaken within the scope of a joint research agreement.

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

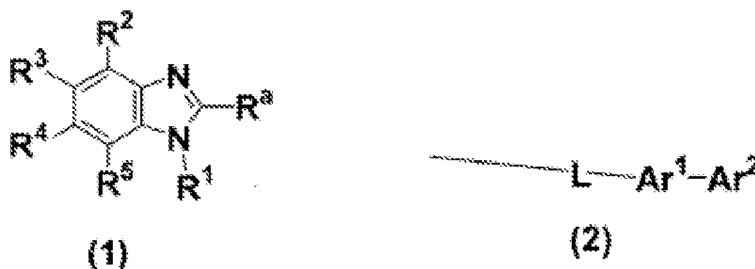
24. Claims 1-20 are provisionally rejected on the ground of nonstatutory

obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/691888. Although the conflicting claims are not identical, they are not patentably distinct from each other because application number 11/691888 claims a nitrogen containing heterocycle with the formula (1) shown below where at least one R group has formula (2). Since the instant application is not limited by the nature of the heterocycle, the scope of the claims in the two applications overlaps.



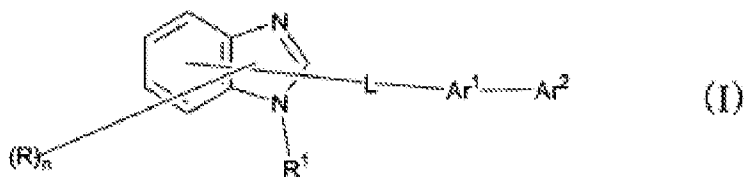
This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

25. Claims 1-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 11/566008. Although the conflicting claims are not identical, they are not patentably distinct from each other because application number 11/566008 claims a compound with the formula (1) shown below, where at least one R group has the formula (2). Since the instant application is not limited by the nature of the heterocycle, the scope of the claims in the two applications overlaps.



This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

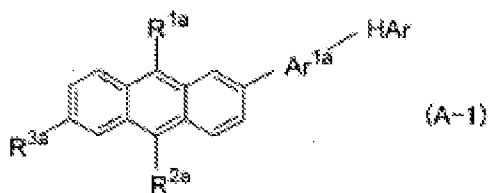
26. Claims 1-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/547312. Although the conflicting claims are not identical, they are not patentably distinct from each other because Application Number 10/547312 claims material of formula (1) shown below, where L, Ar<sup>1</sup> and Ar<sup>2</sup> are defined the same as in the instant application. Since the instant application is not limited by the nature of the heterocycle, the scope of the claims in the two applications overlaps.



27.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

28. Claims 1-20 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1 of copending Application No. 10/594323. Although the conflicting claims are not identical, they are not patentably distinct from each other because Application number 10/594323 claims a heterocyclic compound of the formula (A-1) shown below where HAr corresponds to HAr of the instant application, Ar<sup>1a</sup> corresponds to L, the anthracene corresponds to Ar<sup>1</sup> and R<sup>3a</sup> corresponds to Ar<sup>2</sup> of the instant application. Since the instant application is not limited by the nature of the heterocycle, or the anthracene, the scope of the claims in the applications overlaps.



29.

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

***Conclusion***

Any inquiry concerning this communication or earlier communications from the examiner should be directed to MICHAEL E. NELSON whose telephone number is (571)270-3453. The examiner can normally be reached on M-F 7:30am-5:00pm EST (First Friday Off).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Callie Shosho can be reached on 571-272-1123. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. Lawrence Tarazano/  
Primary Examiner, Art Unit 4174

Michael E. Nelson  
Examiner  
Art Unit 4174